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ONE NEW SPECIES AND TWO REDESCRIPTIONS OF CATFISHES OF THE SOUTH AMERICAN CALLICHTHYID GENUS CORYDORAS

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Recent examination of three specimens of a new catfish from Brazil, herein described as *Corydoras semiaquilus*, has instigated reexamination and redescription of its apparent relatives, *C. treitlii* Steindachner (1906) and *C. fowleri* Böhlke (1950). *C. fowleri* is known only from the holotype, which was described without illustration. In addition, the original description of *C. fowleri*, like that of *C. cochui* Myers and Weitzman (1954) (see Weitzman, 1956), was published in an aquarium magazine not available in many university libraries, *C. treitlii* has never been illustrated and its original description, although excellent for its time, is now inadequate in the light of many subsequent new species. Discovery of apparent close relatives of *C. treitlii* has made reexamination and description of the type specimens imperative.

I am indebted to Professor George S. Myers for the loan of specimens and the use of facilities in the Division of Systematic Biology at Stanford University; to Dr. Paul Kähsbauer of the Naturhistorisches Museum, Wien, for the loan of type specimens of *Corydoras* described by Franz Steindachner; to Mr. W. I. Follett, Curator of Fishes of the California Academy of Sciences, for the loan of specimens; to Mr.

Harald Schultz, São Paulo, Brazil, for locality data and for collecting the specimens of *C. semiaquilus;* and to Dr. Herbert Axelrod of Jersey City, New Jersey, for two specimens of *C. semiaquilus.* I also wish to thank Dr. W. Klausewitz and Mr. Fritz Rössel of the Senckenbergische Naturforschende Gesellschaft, Natur-Museum und Forschungs-institut, for the loan of a specimen of *C. semiaquilus.*

The following abbreviations are used:

NMW—Naturhistorisches Museum, Wien
USNM—United States National Museum
SU—Division of Systematic Biology, Department of Biological Sciences, Stanford University
SM—Senckenberg Museum.

Corydoros treitlii Steindachner

FIGURES 1 and 2

Corydoras treitlii Steindachner, 1906, p. 478 (original description; type locality: mouth of a small stream emptying into the Rio Parnahyba at Victoria, State of Maranhão, Brazil).—Eigenmann, 1910, p. 403 (listed).—Miranda Ribeiro, 1911, p. 167 (description copied from Steindachner, 1906).—Regan, 1912, p. 210 (description copied from Steindachner, 1906).—Ellis, 1913, p. 407 (listed).—Gosline, 1940, p. 15 (aquarium specimen, no description); 1945, p. 74 (listed).—Stigchel, 1946, p. 129 (description of specimen from original collection).—Böhlke, 1950, p. 27 (discussion of relationships with *Corydoras fowleri*).—Fowler, 1954, p. 67 (listed).

LECTOTYPE.—NMW 61103, standard length 42.6 mm., collected during 1903 by Franz Steindachner at mouth of brook emptying into Rio Paranhyba [Parnaíba River] at Victoria [Alto Parnaíba], State of Maranhão, Brazil.

ADDITIONAL SPECIMENS.—NMW 47798, paralectotype, standard length 42.4 mm., same data as lectotype; USNM 176912, standard length 52.5 mm., São Paulo, Brazil, Herbert Axelrod, 1958; SU 35054, standard length 47.0 mm., sent to the Division of Systematic Biology, Stanford University, by Mr. Fred H. Stoye in March 1937. Mr. Stoye stated that, according to Mr. N. Greim, this is an aquarium specimen from the Amazon. In my opinion this locality data is uncertain. This is the specimen utilized by Gosline (1940).

DIAGNOSIS.—*Corydoras treitlii* may be distinguished from other species of *Corydoras* by the following combination of characters: Snout long, about 30 to 32% of body length without head. Least caudal peduncle depth about 57 to 62% of snout length. Imbricated thoracic and abdominal plates absent; fine bony prickles present in these regions. Dorsal fin spine about equal in length to pectoral fin spine. Predorsal length about 79 to 89% of distance between dorsal fin origin and caudal fin base. Caudal fin without bars.

DESCRIPTION.—(For actual measurements see table 1.) In the description below, the proportions are given first, percentages follow in parentheses, both of which derive from standard length unless otherwise designated. Data for the lectotype, NMW 61103, is given first, data for NMW 47798 follows in brackets. Data for USNM 179612 and for SU 35054 are designated by respective abbreviations.

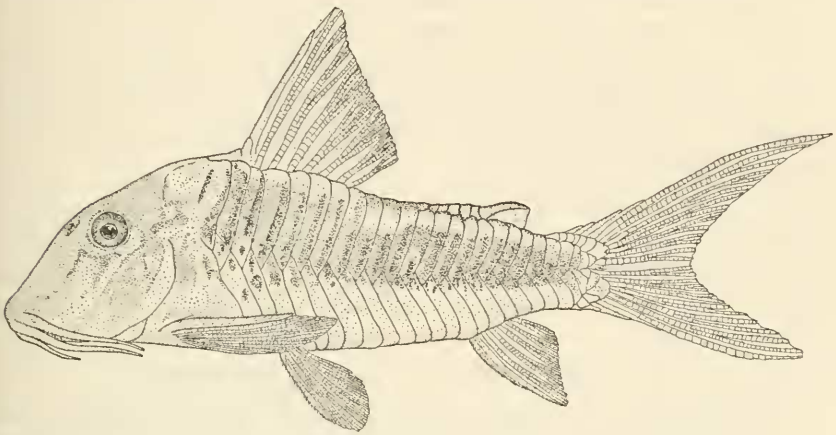

FIGURE 1.—*Corydoras treitlii* Steindachner, lectotype, NMW 61103. Standard length 42.6 mm.

Body fairly elongate, compressed posteriorly. Greatest body depth 2.9 (34.8%) [2.8 (35.6%)], USNM 2.8 (35.8%), SU 2.9 (34.4%). Least depth of caudal peduncle 7.5 (13.4%) [7.2 (13.9%)], USNM 7.7 (15.0%), SU 7.6 (13.1%). Distance between snout tip and dorsal fin origin 1.8 (56.4%) [2.0 (49.1%)], USNM 2.0 (51.0%), SU 1.9 (52.3%). Distance between snout tip and anus 1.9 (52.8%) [1.8 (55.0%)], USNM 1.9 (52.0%), SU 2.0 (49.8%). Anal fin origin to snout tip 1.3 (80.0%) [1.2 (80.8%)], USNM 1.3 (79.8%), SU 1.2 (80.6%). Lateral scutes 24/21 in all four specimens. Abdomen and thorax with small prickles in all specimens, no heavy imbricated plates. In SU 35054, a poorly preserved specimen, many of these prickles have been broken off in exposed areas but their bases remain. Azygous middorsal scutes 6 [4], USNM 4, SU 5, before adipose fin. One azygous scute before dorsal fin in all specimens. Pectoral fin base incompletely surrounded by coracoid in all specimens. Distance between coracoids variable (probably wider in females than in males) 10.9 (9.2%) [9.2 (10.9%)], USNM 11.3 (8.8%), SU 13.4 (7.5%). Head length 3.0 (33.3%) [2.9 (33.8%)], USNM 3.0 (33.3%), SU (34.2%). Greatest head width 1.4 (71.8%) [1.5 (68.7%)], USNM 1.5 (67.4%), SU 1.7 (59.5%) in head length. Least width of bony inter-

orbital 3.2 (31.0%) [4.0 (25.2%)], USNM 3.1 (32.0%), SU 3.5 (28.4%) in head length. Snout acute in dorsal view. Snout tip rounded in lectotype, much more acute in SU 35054 (a poorly preserved, dehydrated specimen). Snout 1.4 (70.4%) [1.5 (66.4%)], USNM 1.6 (64.0%), SU 1.5 (64.9%) in head length. Dorsal profile of snout slightly concave in all specimens. When directed posteriorly, both upper rictal (actually maxillary) and lower rictal barbels reach a point on a vertical about half an orbital diameter behind posterior edge of the orbit. Greatest diameter of bony orbit 3.8 (26.1%) [4.6 (21.7%)], USNM 4.1 (24.6%), SU 3.9 (25.8%) in head length. Greatest width of suborbital 2.3 (43.3%) [1.5 (67.7%)], USNM 1.4 (69.8%), SU 2.4 (41.1%) in orbit.

Dorsal fin I, 7, last fin ray split to its base in all specimens. Spine of dorsal fin when depressed reaching to, or slightly beyond, posterior termination of dorsal fin base, distant from origin of adipose fin. Adipose fin spine in orbit 1.0 (97.4%) [1.0 (100.3%)], USNM 1.3 (79.0%), SU 1.2 (84.7%). Anal fin ii,5, last ray split to its base in all specimens. USNM 179612 could be interpreted as ii,6, last fin ray not split to its base. The last two ray elements of the anal fin in this specimen are well separated and probably each ray base belongs to its own separate pterygiophore series. Pectoral fin I,10, [I,11], USNM I,10, and SU I,10. Pelvic rays i,5, in all specimens. Principal caudal rays 7/7 in all specimens. Pectoral fin spine (see fig. 2) with 16 [18], USNM 21, SU 16, stout spinules along its posterior border.

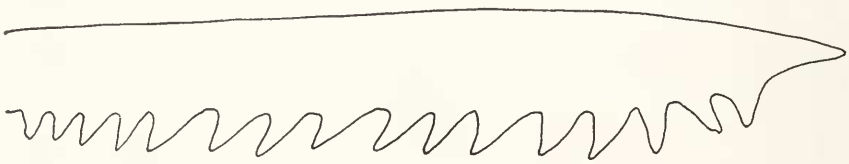

FIGURE 2.—*Corydoras treitlii* Steindachner. Pectoral fin spine of lectotype, ventral view, left spine.

COLOR.—The lectotype has the following color pattern in alcohol (see also fig. 1): Basic body color yellowish gray. Head with brown markings as shown in figure 1; no punctate or vermiculate markings over snout or head. Sides with purplish dark brown markings on upper body scutes. All specimens with all fins hyaline, completely lacking bars, bands, or blotches. All specimens with color pattern very similar to lectotype except that SU 35054 greatly faded. Color in life not known.

Corydoras fowleri Böhlke

FIGURES 3 and 4

Corydoras fowleri Böhlke, 1950, p. 26 (original description; type locality: Caño del Chancho, near Pevas, Peru).

HOLOTYPE: SU 16115, a female 66.0 mm. in standard length, collected December 13, 1941, by Mr. William G. Scherer at Caño del Chancho, near Pevas [Pebas], Peru.

DIAGNOSIS.—*Corydoras fowleri* may be distinguished from other known species of *Corydoras* by the following combination of characters: Snout relatively long, about 25% of body length without head. Least caudal peduncle depth about 55% of snout length. Imbricated thoracic and abdominal plates present. Dorsal fin spine weaker and shorter than pectoral fin spine. Predorsal length about 67% of postdorsal length.

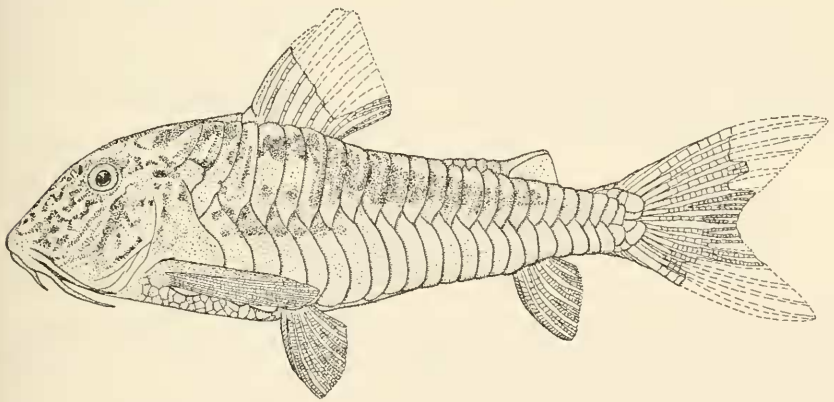

FIGURE 3.—*Corydoras fowleri* Böhlke, holotype, SU 16115. Standard length 66.0 mm.

DESCRIPTION.—(See table 1 for measurements.) For explanation of descriptive pattern below, see p. 117.

Body elongate, especially slender posterior to dorsal and pelvic fins; greatest body depth 3.3 (30.8%). Least depth of caudal peduncle 10.0 (10.0%). Dorsal fin origin much nearer to snout tip than caudal fin base. Distance between snout tip and dorsal fin origin 2.3 (43.4%). Distance between snout tip and anus 2.0 (49.5%). Anal fin origin to snout tip 1.2 (80.0%). Lateral scutes 24/21. Abdomen and thorax entirely covered with small- to moderate-sized imbricated plates. Azygous middorsal scutes 5 anterior to adipose fin, 1 anterior to dorsal fin. Pectoral fin base incompletely surrounded by coracoid, interval or hiatus filled with moderate-sized plates continuous with those of abdomen and thorax. Distance between coracoids 7.8 (12.9%). Head length 3.8 (26.6%); greatest

head width 1.3 (75.5%) in its length. Least width of bony interorbital 3.1 (32.0%) in head length. Snout acute in dorsal view but snout tip rather rounded. Snout length 1.4 (69.2%) in head length. Dorsal profile of snout slightly concave. When directed posteriorly, both rictal barbels of both sides reach a point on a vertical line from posterior eye margin. Greatest diameter of orbit 4.4 (22.8%) in head length. Greatest width of suborbital 2.9 (35.0%) in orbit.

Dorsal fin I,7, last fin ray split to its base. Dorsal fin damaged, its spine and anteriormost rays partially lost as shown in figure 3. Dorsal fin spine rather slender, considerably more slender than the pectoral fin spines. Adipose fin spine 0.95 (104.8%) in orbit. Anal fin ii,5, last ray split to its base. Böhlke (1950) reported the anal fin count as "I,5, the last ray widely split to its base." I found that in taking counts and measurements I had counted this fin as i,5; however, during careful examination of the fin while preparing figure 3, I found that what appeared to be a single nonpungent spine was actually two very closely adpressed nonpungent spines. Pectoral elements I,10. Pelvic fin rays i,5 on both sides. Caudal fin, although both lobes broken, with principal rays 7/7. Pectoral fin spine (fig. 4) has 30 spinules along its posterior border.

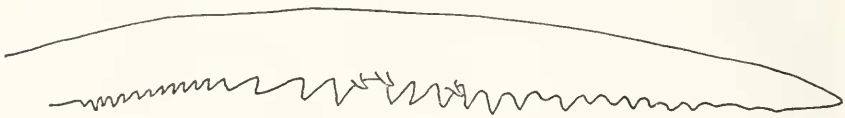

FIGURE 4.—*Corydoras fowleri* Böhlke. Pectoral fin spine of holotype, ventral view, left spine.

COLOR.—Specimen appears somewhat faded. Overall body color very pale brown. Ventral region below gills white. Just posterior to this region, at origin of belly scutes, belly region becomes very pale brown. Pattern of dark brown markings shown in figure 3. This pattern described by Böhlke (1950) as follows:

> . . . dark blotch along base of dorsal fin, abruptly shifted ventrally at a vertical with the fifth articulated dorsal ray. This posterior continuation of the blotch covers the lower two-thirds of the upper row of lateral scutes, and continues back to below the adipose dorsal. Several small dark spots at the upper end of the gill openings, somewhat resembling a broken-up humeral spot. Top of head, snout, and cheeks covered by wavy longitudinal dark lines.

Little can be added to this description.

DISCUSSION.—As noted by Böhlke (1950), *Corydoras fowleri* appears to be related to *C. treitlii*; however, as he remarked, it differs from *C. treitlii* in possessing imbricated thoracic and abdominal plates and a longer body in relation to head length. In addition to these charac-

ters, it has a much weaker (and probably shorter) dorsal fin spine than pectoral spine. The pectoral and dorsal fin spines of *C. treitlii* are about equal in diameter and length. *Corydoras fowleri* appears closely related to *C. semiaquilus* but differs in the characteristics noted under the latter species.

The swollen appearance of the holotype of *Corydoras fowleri* indicates that the specimen is probably a gravid female. This probability was verified by probing between the lower third and fourth lateral scutes of the right side in the upper regions of the coelomic cavity, where a few mature eggs were recovered. Since the holotype and only known specimen of *C. fowleri* is a female, apparently swollen with ripe eggs, and since males of the genus *Corydoras* are usually slenderer than their female counterparts, it is quite likely that the species *C. fowleri* has an average body depth much less than that indicated here. Thus, *C. fowleri* probably differs more from *C. semiaquilus* and *C. treitlii* with regard to body depth than the data avilable at present would indicate.

In summary, *Corydoras fowleri* is related most closely to *C. semiaquilus* but differs from that species in its shorter snout, longer caudal peduncle length, lesser body depth, proportionately smaller eye, and shorter head length.

Corydoras semiaquilus, new species

FIGURES 5 and 6

HOLOTYPE.—SU 55939, standard length 60.9 mm., collected during December of 1960 by Harald Schultz from Igarapé Preto, according to Mr. Schultz, "a small jungle-rivulet at the headwaters of the black-water creeks, which empty in the upper Solimoes, State of Amazonas, Brazil. These small and narrow creeks have crystal clear water, sandy bottom, covered with pebbles, leaves and rotten leaves."

ADDITIONAL SPECIMENS.—USNM 196170, standard length 59.1 mm.; SM 5349 damaged but standard length about 54 mm. Both with the same data as the holotype.

DIAGNOSIS.—*Corydoras semiaquilus* may be distinguished from other species of *Corydoras* by the following combination of characters: It has a long snout (snout length about 32 to 33% of body length without head). Least caudal peduncle depth about 49 to 51% of snout length. Most species of *Corydoras*, except for the long snouted species, have the least depth of the caudal peduncle and the snout length about equal. Imbricated thoracic and abdominal plates present. Dorsal fin spine considerably weaker and shorter than pectoral fin spine. Predorsal length about 85 to 86% of distance between dorsal fin origin and caudal fin base. Caudal fin heavily barred.

DESCRIPTION.—(See table 1 for measurements.) For explanation of descriptive pattern below, see p. 117. SU 55939 is given first, USNM 196170 follows in brackets. Measurements of SM 5349 are not given because the head is badly damaged, making accurate measurements impossible.

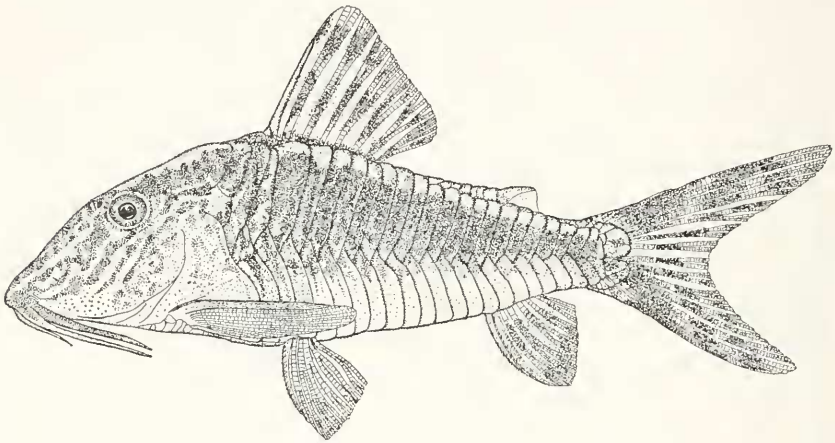

FIGURE 5.—*Corydoras semiaquilus*, new species, holotype, SU 55939. Standard length 60.9 mm.

Body relatively elongate, greatest body depth 3.0 (33.5%) [3.0 (33.5%)]. Least depth of caudal peduncle 8.9 (11.2%) [8.6 (11.7%)]. Dorsal fin origin nearer snout tip than caudal fin base. Distance between snout tip and dorsal fin origin 2.0 (50.7%) [2.1 (48.2%)]. Distance between snout tip and anus 1.9 (52.8%) [1.9 (52.5%)]. Anal fin origin to snout tip 1.2 (81.5%) [1.2 (80.4%)]. Lateral scutes 24/21 [26/23]. Abdomen entirely covered with small to moderate-sized imbricated bony plates. Azygous middorsal scutes 7 [6] anterior to adipose fin and 1 [1] anterior to dorsal fin. Pectoral fin base incompletely surrounded by coracoid. Distance between coracoids 8.5 (11.8%) [9.0 (11.2%)]. Head length 3.0 (32.9%) [3.0 (33.2%)]; greatest head width 1.5 (65.5%) [1.5 (64.8%)] in its length. Least width of bony interorbital 4.1 (24.6%) [3.9 (25.5%)] in head length. Snout acute in dorsal view but snout tip rather broadly rounded. Snout 1.4 (69.5%) [1.4 (69.5%)] in head length. Dorsal profile of snout concave in both specimens. When directed posteriorly, both rictal barbels reach a point on a vertical line passed down from posterior eye margin. Greatest diameter of orbit 4.4 (22.5%) [4.4 (22.9%)] in head length. Greatest width of suborbital 2.8 (35.6%) [1.8 (55.5%)] in orbit.

Dorsal fin I,7, in all specimens, last fin ray split to its base. Neither first spine nor first soft ray of dorsal fin reaches base of adipose spine when dorsal fin depressed. Dorsal fin spine much slenderer and shorter than pectoral fin spine. Adipose spine 1.5 (66.7%) [1.3 (77.8%)] in orbit. Anal fin ii,5, in all specimens, last ray split to base in SU 55939 and SM 5349 and not split to its base in USNM 196170. Pectoral fin I,11, in SU 55939 and USNM 196170, I,10, in SM 5349. Pelvic fin rays i,5, in all specimens. Caudal fin with principal rays 7/7 in all specimens. Pectoral fin spine (fig. 6) has 26 [24] spinules along its posterior border. There are 22 spinules in SM 5349.

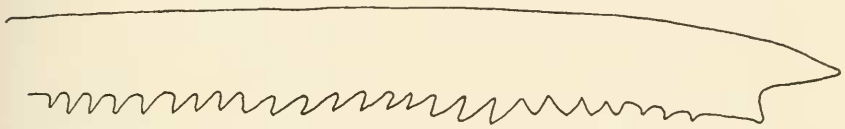

FIGURE 6.—*Corydoras semiaquilus*, new species. Pectoral fin spine of holotype, ventral view, left spine.

COLOR.—The holotype has the following color in alcohol (see also fig. 5): Ground color white to pale brown. Head with punctate to vermiculate dark brown or black markings, more punctate over snout and between eyes. Sides of head with black to gray markings. Belly, thorax, and lower one-third of body white. Upper two-thirds of body dark except for narrow streak of pale brown below dorsal fin. This pale area extends posteriorly to caudal fin above dorsal margin of body. Dorsal fin with two rather irregular black bars; caudal fin with three irregular black vertical bars. Anal fin with two black bars. Pelvic fins colorless except for some scattered melanophores over central portions of rays. Basal two-thirds of pectoral fin rays dark and entire pectoral fin spine dark. Color of paratypes very similar to that of holotype.

Color in life (from a Kodachrome) as follows: Dark areas seen in figure 5 black with slight suggestion of blue and purple. Greenish iridescence over lateral part of coracoid bone and golden iridescence over opercular bone. Pale areas of body very pale brown, somewhat pinkish in thoracic and abdominal regions while pale strip along dorsal edge of body somewhat darker brown. Iris around pupil golden, shading to black at edge of eye.

The name "semiaquilus" is from Latin (semi=half and aquilus=dark colored) referring to the dark color on the upper body scutes.

DISCUSSION.—The relationships of *Corydoras semiaquilus* seem to be clearly the long-snouted *Corydoras* such as *treitlii, acutus, cervinus, fowleri, pastazensis,* and *septentrionalis.* So far as known, it differs from all of these but *C. fowleri* in the possession of a thick layer of imbricated dermal plates on the abdomen and thorax. The species

appears closely related to *C. treitlii* because of its very long snout, its bony interorbital width contained twice or more in the snout length, its relatively slender caudal peduncle, and its color pattern. The obvious differences between *C. treitlii* and *C. semiaquilus* are the imbricated bony plates on the belly and thorax of the latter (the former has prickles only), a much longer pectoral spine in *C. semiaquilus* (see table 1 for comparison), a banded caudal fin in *C. semiaquilus* (caudal bands are absent in *C. treitlii*), and fairly consistent differences in caudal peduncle depth between the two species. The profile of the snout and dorsal part of the head is consistently different in *C. treitlii* and *C. semiaquilus*. *Corydoras treitlii* has the caudal peduncle depth 57.0 to 62.1% of the snout length while in *C. semiaquilus* it is 48.9 to 50.8%.

Corydoras cervinus differs from *C. semiaquilus* in lacking caudal fin bars, in having larger spinules on the pectoral fin spine, and apparently in lacking belly scutes. Rössel (1962) records the caudal peduncle depth for *C. cervinus* as 7 times in the standard length. In *C. semiaquilus* it is 8.6 to 8.9 times in the standard length.

Of the other known species with an interorbital contained twice or more in the snout, *Corydoras fowleri*, 2.2 (42.3%) in snout length, is very much like *C. semiaquilus* in the possession of imbricated thoracic and abdominal scutes and a somewhat similar color pattern. However, these two species differ widely with regard to several proportions. First, *C. fowleri* has a much shorter snout (about 24% of body length without head). Second, the head length of *C. fowleri* is 26.6% and that of *C. semiaquilus* is 32.9 and 33.2% of the standard length. Third, the eye of *C. fowleri* is proportionately smaller, being 6.1%, while that of *C. semiaquilus* is 6.6 to 7.4% of the standard length. Fourth and finally, the dorsal fin is placed farther anteriorly in *C. fowleri*, its predorsal length being 66.5% while that of *C. semiaquilus* is 85.2 to 85.5% of the distance between the origin of the dorsal fin and the caudal fin base. The color patterns of *C. fowleri* and *C. semiaquilus* actually may be quite similar; however, that of *C. fowleri* appears faded and, therefore, accurate comparisons cannot be made.

Another species, *Corydoras pastazensis* Weitzman (1963), is very closely related to *C. treitlii* and on the basis of specimens at hand, may be distinguished from *C. semiaquilus* by the following characters: *C. semiaquilus* has a body depth of 33.5% of the standard length while that of *C. pastazensis* is 36.4 to 37.1%. Body depth, being measured from the ventral border of the posterior coracoid process to the dorsal fin origin, is a stable measurement in *Corydoras*, little affected by the state of nutrition. Caudal peduncle depth of *C. semiaquilus* is 48.9 to 50.8% in the snout length while it is 65.2 to 66.4% in *C. pastazensis*. *Corydoras pastazensis* lacks the dark color pattern in the upper body scutes present in *C. semiaquilus* and lacks the marbled markings on the snout.

TABLE 1.—*Measurements of three* Corydoras *species*

Measurement	*Corydoras treitlii*				*Corydoras semiaquilus*		*Corydoras fowleri*
	Lectotype NMW 61103	NMW 47798	USNM 179612	SU 35054	Holotype SU 55939	USNM 196170	Holotype SU 16115
Standard length	42. 6	42. 4	52. 5	44. 2	60. 9	59. 1	66. 0
Head length	14. 2	14. 3	17. 5	15. 1	20. 0	19. 6	17. 5
Snout length	10. 0	9. 5	11. 2	9. 8	13. 9	13. 6	12. 1
Least width of bony interorbital	4. 4	3. 6	5. 6	4. 3	4. 9	5. 0	5. 6
Greatest diameter of bony orbit	3. 7	3. 1	4. 3	3. 9	4. 5	4. 5	4. 0
Greatest width of suborbital	1. 6	2. 1	3. 0	1. 6	1. 6	2. 5	1. 4
Length of fontanel	5. 5	5. 4	6. 9	6. 5	6. 2	6. 5	4. 5
Length of predorsal scale	2. 5	2. 5	3. 4	3. 0	3. 8	3. 3	3. 7
Greatest width of head	10. 2	9. 9	11. 8	9. 0	13. 1	12. 7	13. 2
Snout tip to dorsal fin origin	24. 0	20. 8	26. 8	23. 1	30. 8	28. 5	28. 6
Snout tip to anal fin origin	34. 0	34. 2	41. 9	35. 6	49. 7	47. 4	53. 0
Snout tip to anterior edge of anus	22. 5	23. 3	27. 3	22. 0	32. 2	31. 0	32. 7
Greatest body depth	14. 8	15. 1	18. 8	15. 2	20. 4	19. 8	20. 3
Least depth of caudal peduncle	5. 7	5. 9	6. 8	5. 8	6. 8	6. 9	6. 6
Distance between coracoids	3. 9	4. 6	4. 7	3. 3	7. 2	6. 6	8. 5
Length of dorsal spine	9. 1	8. 6	10. 2	10. 0	10. 8	10. 6	?
Length of pectoral spine	8. 9	8. 5	11. 6	10. 0	14. 2	13. 9	16. 7
Length of adipose spine	3. 6	3. 2	3. 4	3. 3	3. 0	3. 5	4. 2
Origin of dorsal fin to caudal fin base	27. 1	26. 4	32. 1	26. 7	36. 2	34. 5	43. 0
Post head length	30. 9	29. 9	37. 4	31. 3	42. 7	41. 5	49. 8
Caudal peduncle length	6. 3	6. 0	7. 3	5. 9	8. 5	8. 3	9. 8

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